

Title: SYSTEM AND METHOD FOR PERFORMING PATH-SENSITIVE
VALUE FLOW ANALYSIS ON A PROGRAM

Inventors: Manuvir Das et. al

Docket No: MS#305140.1 / LH# MS1-1734US

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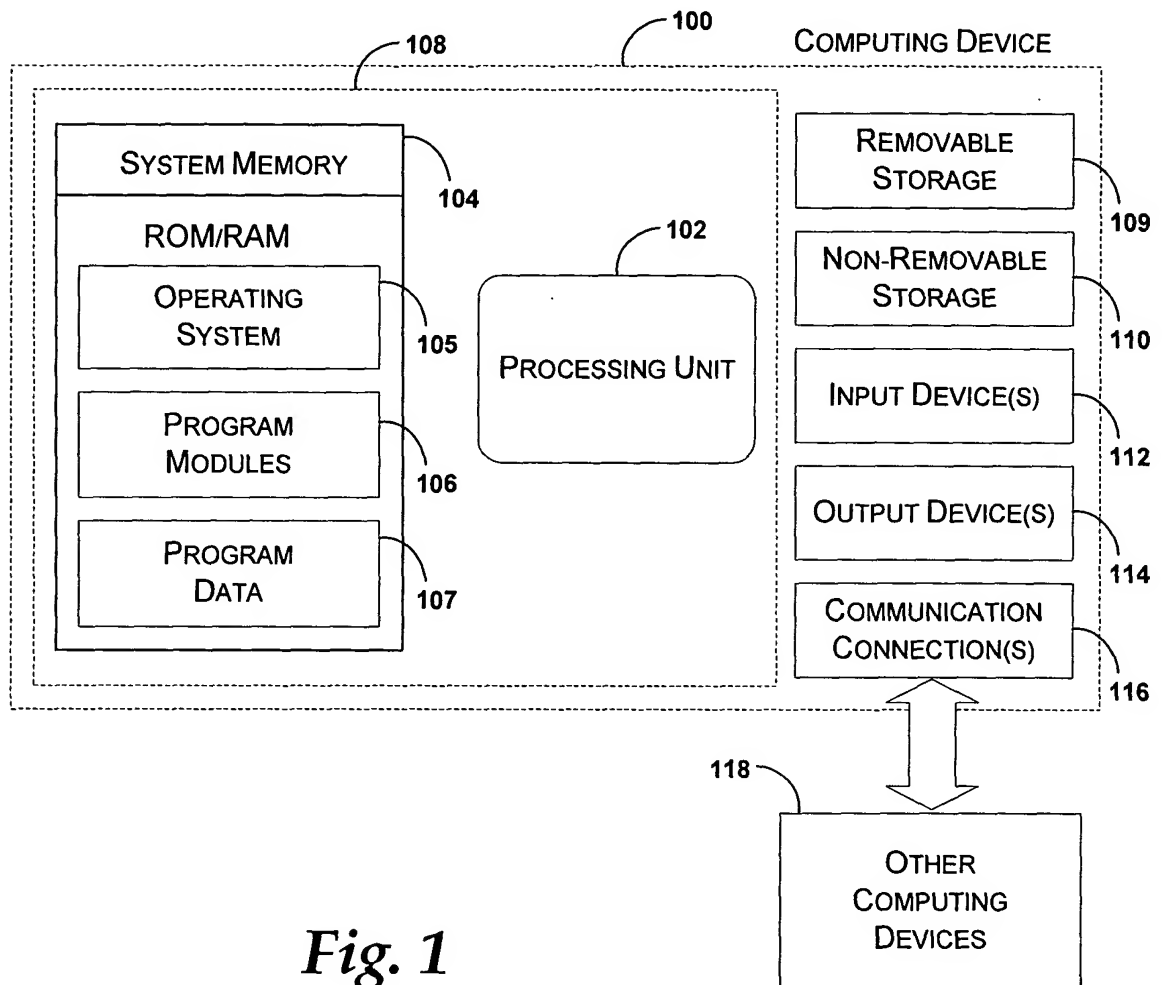


Fig. 1

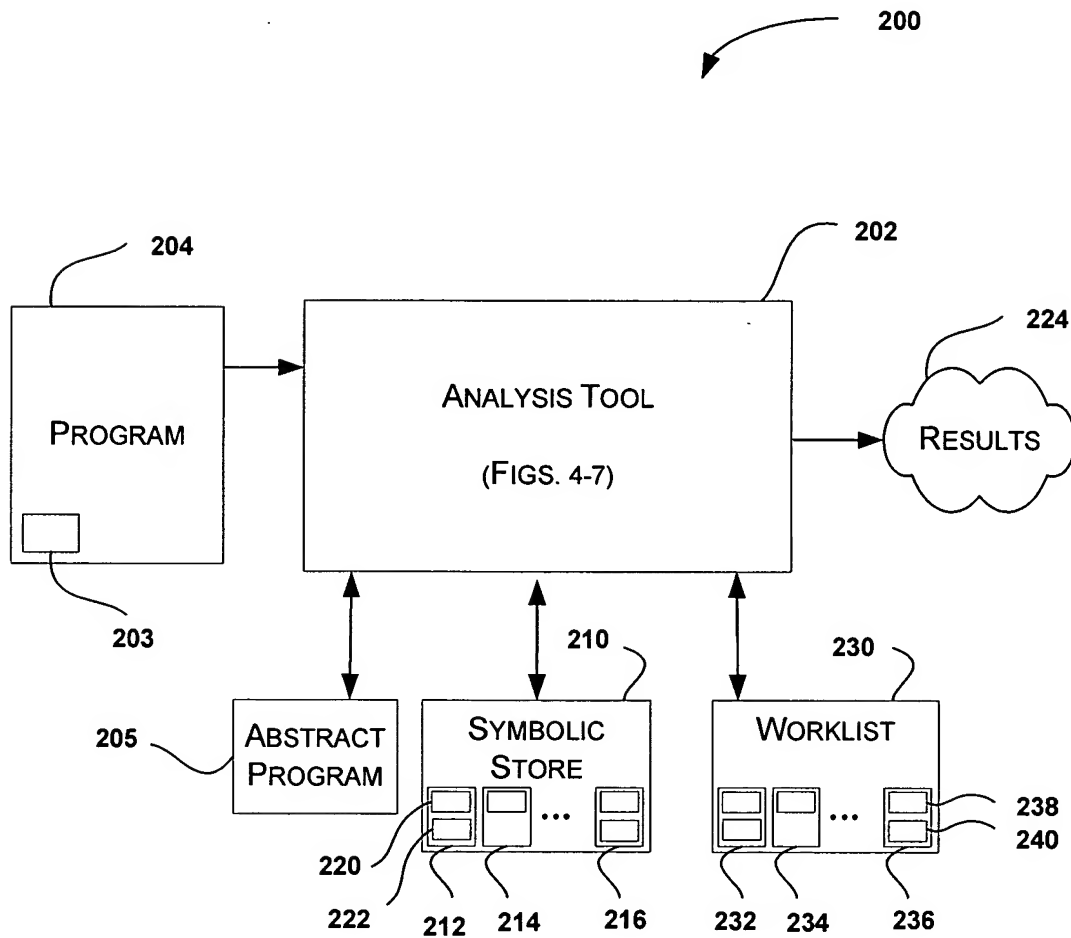
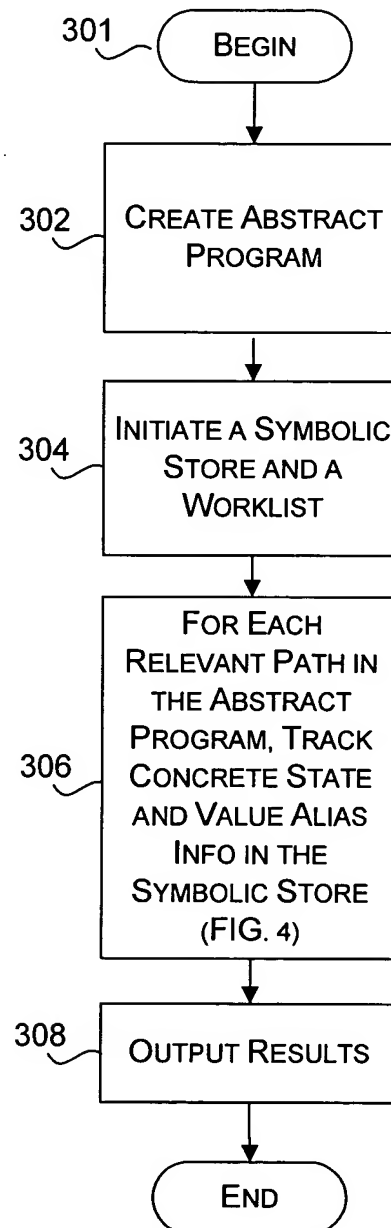


Fig. 2

300

EXEMPLARY PATH-SENSITIVE
VALUE FLOW ANALYSIS PROCESS

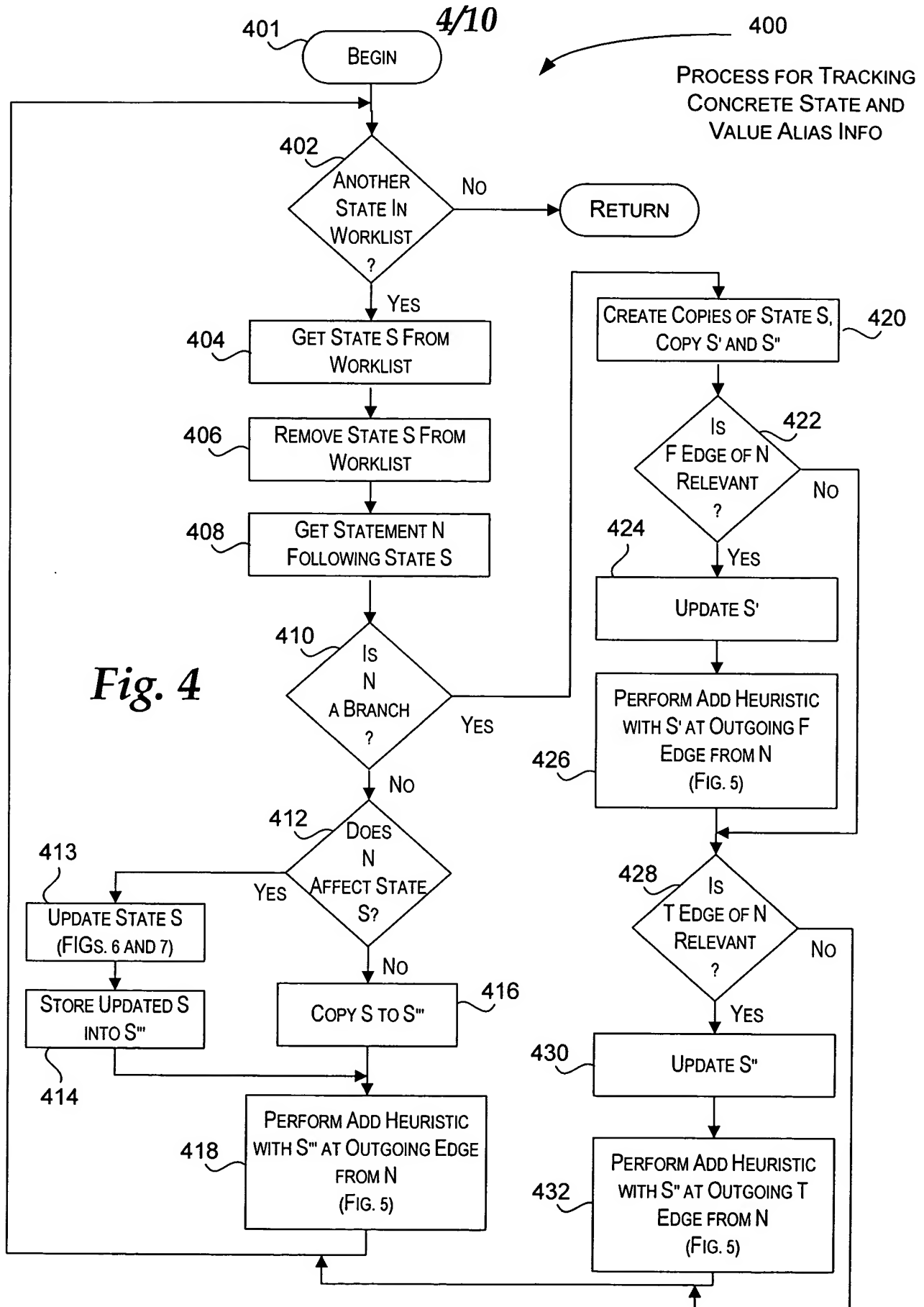
Fig. 3



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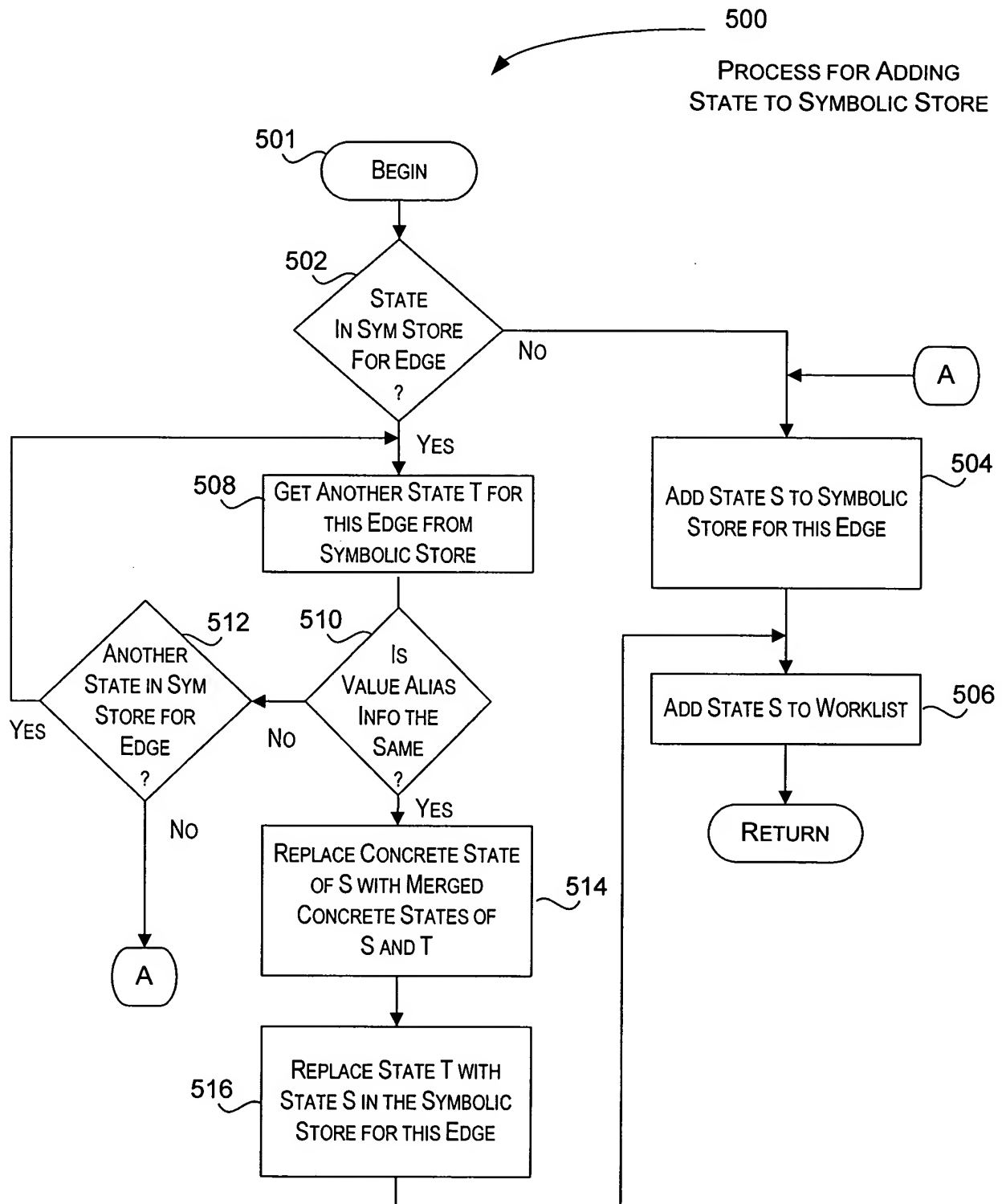


Fig. 5

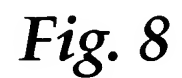
v	Remove	Generate
$x = \text{CREATE}()$	$\{ \}$	$\{ x \}$
$x = y$	$\{ x \rightarrow * \} \cup$ $(\text{if } (y \notin \text{must})$ $\{ x \} \cup \{ z \rightarrow f \mid \text{LocAlias}(z \rightarrow f, x) \})$	$\{ x \mid y \in \text{must} \} \cup$ $\{ x \rightarrow f \mid y \rightarrow f \in \text{must} \}$
$x = \&y$	$\{ x \rightarrow * \} \cup \{ x \} \cup \{ z \rightarrow f \mid \text{LocAlias}(z \rightarrow f, x) \}$	$\{ x \rightarrow \text{NULL} \mid y \in \text{must} \}$
$x = \text{allocate}()$	$\{ x \rightarrow * \} \cup \{ x \} \cup \{ z \rightarrow f \mid \text{LocAlias}(z \rightarrow f, x) \}$	$\{ \}$
$x = y \rightarrow f$	$\{ x \rightarrow * \} \cup$ $(\text{if } (y \rightarrow f \notin \text{must})$ $\{ x \} \cup \{ z \rightarrow g \mid \text{LocAlias}(z \rightarrow g, x) \})$	$\{ x \mid y \rightarrow f \in \text{must} \}$
$x = \&(y \rightarrow f)$	$\{ x \rightarrow * \} \cup \{ x \} \cup \{ z \rightarrow g \mid \text{LocAlias}(z \rightarrow g, x) \}$	$\{ x \rightarrow \text{NULL} \mid y \rightarrow f \in \text{must} \}$
$x \rightarrow f = y$	$\{ z \rightarrow * \mid \text{LocAlias}(x \rightarrow f, z) \} \cup$ $(\text{if } (y \notin \text{must})$ $\{ x \rightarrow f \} \cup \{ z \rightarrow g \mid \text{LocAlias}(x \rightarrow f, z \rightarrow g) \} \cup$ $\{ z \mid \text{LocAlias}(x \rightarrow f, z) \})$	$\{ x \rightarrow f \mid y \in \text{must} \}$
Other	$\{ x \mid \text{LocAlias}(x, \text{Mods}(v)) \} \cup$ $\{ x \rightarrow f \mid \text{LocAlias}(x, \text{Mods}(v)) \vee$ $\text{LocAlias}(x \rightarrow f, \text{Mods}(v)) \}$	$\{ \}$

Fig. 6

700

v	Remove	Generate
$x = \text{CREATE}()$	$\{ \}$	$\{ x \}$
$x = y$	$\{ x \}$	$\{ x \mid \text{LocAlias}(y, \text{may}) \}$
$x = \&y$	$\{ x \}$	$\{ \}$
$x = \text{allocate}()$	$\{ x \}$	$\{ \}$
$x = y \rightarrow f$	$\{ x \}$	$\{ x \mid \text{LocAlias}(y \rightarrow f, \text{may}) \}$
$x = \&(y \rightarrow f)$	$\{ x \}$	$\{ \}$
$x \rightarrow f = y$	$\{ \}$	$\{ x \rightarrow f \mid \text{LocAlias}(y, \text{may}) \}$
Other	$\{ \}$	$\{ e \mid (e \in \text{Mods}(v)) \wedge \text{LocAlias}(\text{Refs}(v), \text{may}) \}$

Fig. 7



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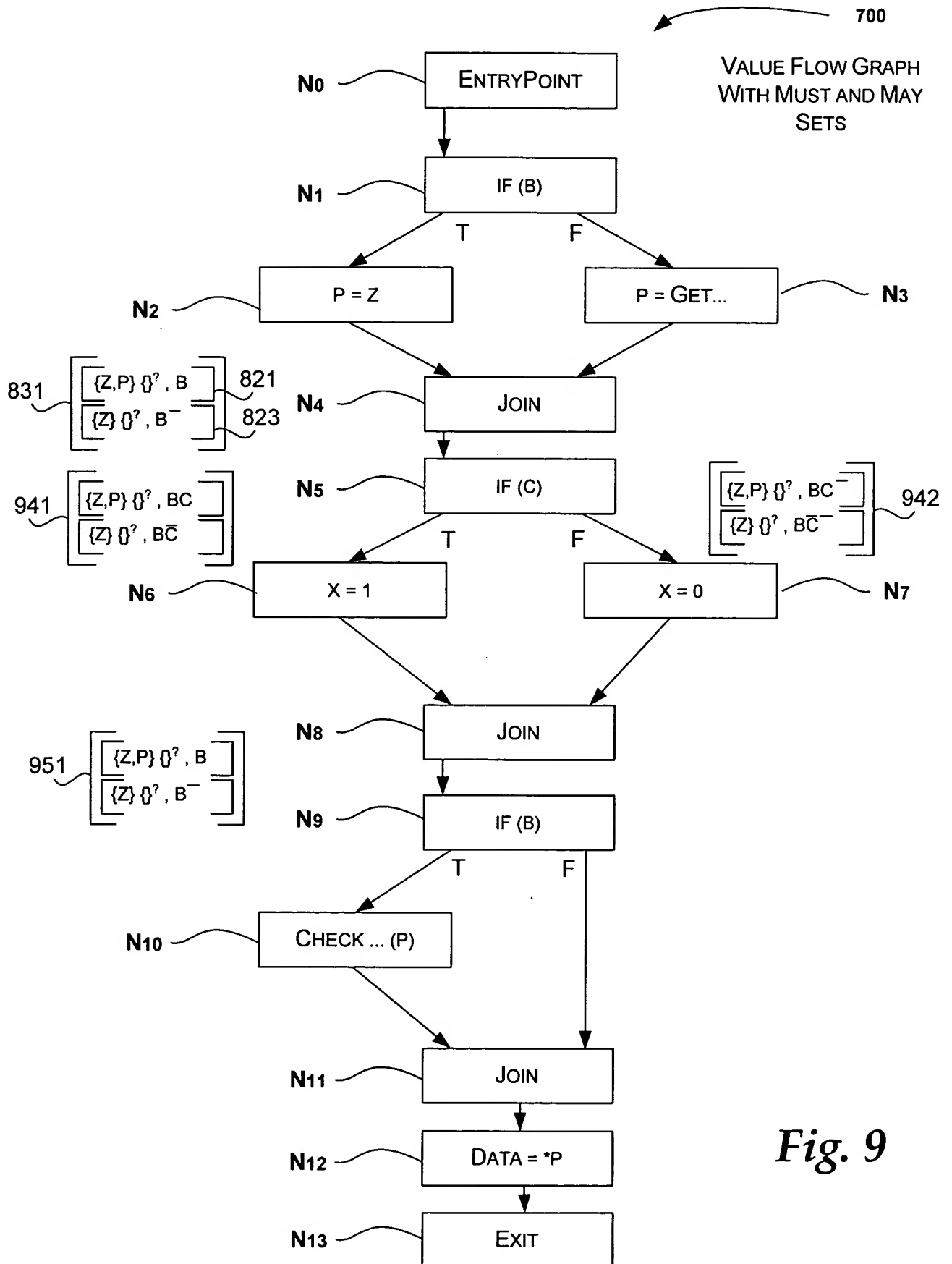


Fig. 9

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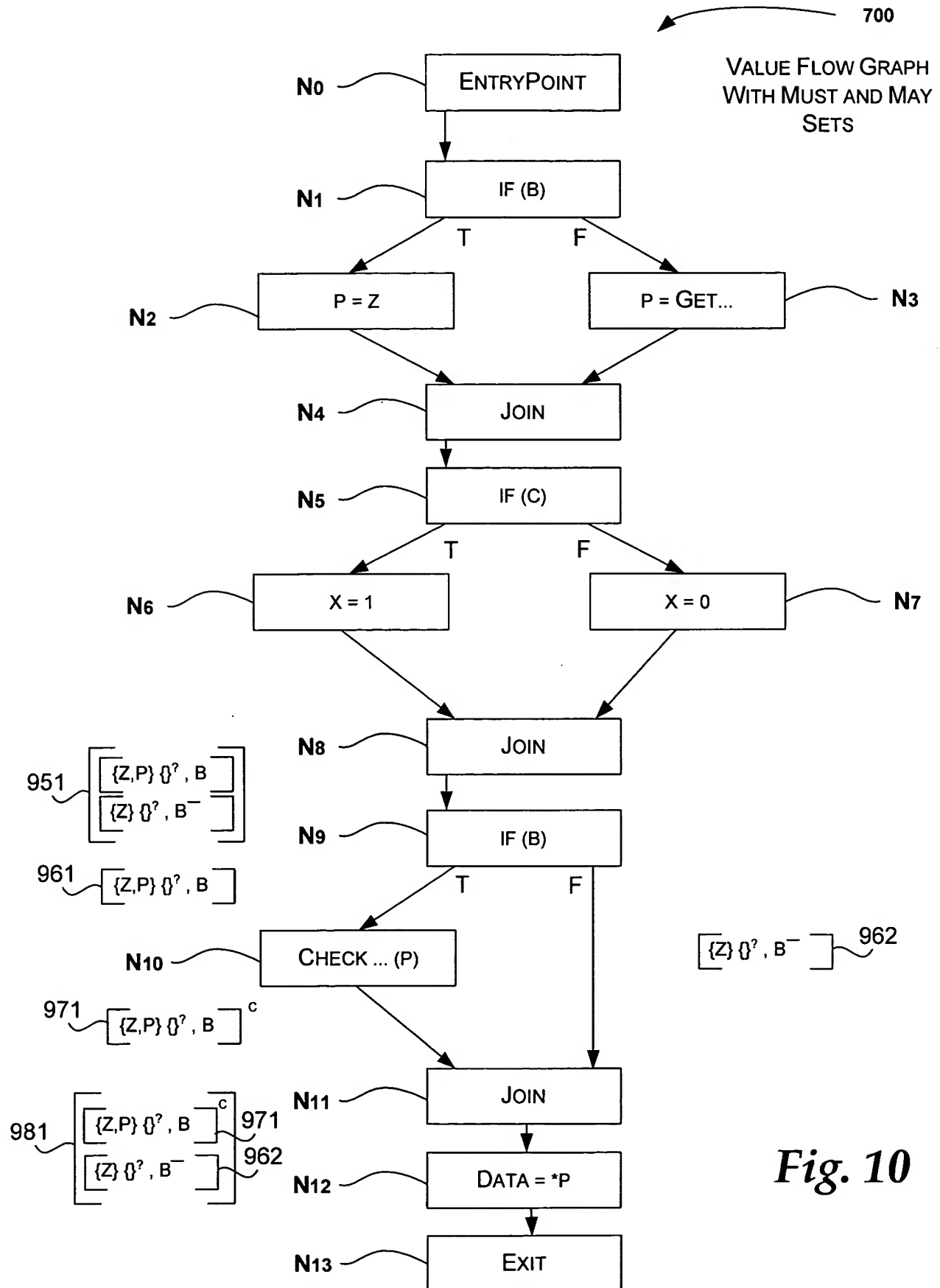


Fig. 10